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United States Department of Agriculture | Forest Service | RO

Reply: 3400 Date:

Subject: Douglas-fir Blowdown

To: Forest Supeervisor, Mt. Baker-Snoqualmie NF

On July 2, 1991, Dave Bridgwater, entomologist, from Forest Pest Management visited the Mt. Baker District to asses the Douglas-fir beetle attacks in the blowdown caused by a December windstorm and the potential for beetle populations to build up in this material and attack standing green trees. During his trip, he was accompanied by Barbara Busse, Forest silviculturalist.

About 50 percent of the material that blew down was douglas-fir. The remainder of the tres were hemlock and silver fir. The blowdown varied from single scattered trees to patch where most of the trees were blown down. This blowdown occurred around Baker Lake in a Spotted Owl Habitit Conservation area. A lot of the blowdown which occurred around active logging sites has already been removed. This should help lessen future green tree mortality.

Douglas-fir blowdown usually provides prime habitat for Douglas-fir bark beetles to rapidly increase their populations and move from this blowdown and attack additional standing damaged or undamaged trees. In addition, silver fir beetles could develop in the true fir blowdown, and ambrosia beetles may attack all species involved.

At the time of this visit, Douglas-fir beetle and ambrosia had attacked the down material. The Douglas-fir beetl's attack density was about one attack per square foot of surface area. This attack density is heavy enough to utilize most of the available host material, but not so heavy that competition between the beetles for available food should occur. This attack rate should produce close to the maximum beetle brood success. The type of future mortality that can be expected is similar or a little higher as stated in the following report. Ambrosia beetles, while not apparent on all trees, appeared to be moderately high through out the area. There was no observed activity by silver fir beetle.

Attached is a general paper on the beetles that can be expected to attack the down material. The estimates of future mortality should be estimated based on the blowdown remaining that will not be salvaged, not on the original amount of blowdown.

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Forest Pest Management

cc: Baker RD

INSECT POTENTIAL AND PROJECTED EFFECTS FOLLOWING BLOWDOWN ON WESTSIDE FORESTS

Severe windstorms periodically affect widespread areas in Western Oregon and Washington. At times, soils in many areas are saturated due to previous rainstorms. This combination of waterlogged soils and high winds lead to scattered areas of windthrown trees in many forested areas. This paper presents Forest Pest Management's expectation of insect status and expected effects on westside forests following blowdown.

DOUGLAS-FIR BEETLE

The primary insect that infests windthrown Douglas-fir is the Douglas-fir beetle (DFB), Dendroctonus pseudotsugae. This beetle generally has one generation per year: adults attack trees from April to May. Douglas-fir beetles generally attacks weakened or windthrown trees, and is commonly associated with root disease centers. Portions of windthrown trees or fresh slash that are exposed to sunlight are often not successfully colonized by DFB because the phloem dries out before the beetles complete their life cycle. Thus, the number of DFB that emerge from windthrown trees depends on the pattern of blowdown (i.e., in patches with many down trees in full sunlight versus individually in shaded locations) as well as the number and size of the down trees. Trees that are blown down and either lightly attacked or not attacked the first year, yet retain favorable moisture conditions in the cambium, can remain suitable host trees into the second year.

In the absence of factors that favor DFB populations (large numbers of windthrown trees, extensive root disease centers, severe drought, etc.), these beetles are commonly found at low population levels throughout Douglas-fir forests. The critical threshold of down material needed to spark rapid DFB increases is not known with certainty. Based on our experience in westside forests, we generally expect that when the number of fully shaded, windthrown trees reaches or exceeds 3 trees per acre, DFB populations will begin to increase to levels where future attack and mortality of standing live trees can be expected.

At present, we have only very rough guidelines for predicting the number of live, standing trees that will be attacked by DFB emerging from infested trees, and no guidelines for estimating the locations of newly-attacked trees. Foliage often does not fade until the year following the initial attack, after most of the emerging brood adults have already left the tree. While the location of newly-attacked trees is not predictable in westside forests, such trees generally occur in small pockets of 5-20 trees, and are often associated with root disease centers, root sprung trees or trees with heavily damaged crowns. Where weakened hosts are not available, Douglas-fir beetle can successfully colonize and kill healthy green trees. Our experience has been that immediately adjacent healthy stands are no more likely to sustain new attacks than are stands several miles away.

Based on experience following the Columbus Day storm of 1962 and other severe windstorms, we have developed the following rules-of-thumb for the average type event following blowdown using the number of currently infested trees to predict the number of newly attacked trees on westside Douglas-firs (this is an example of where 100 trees are blown down and attacked):

Number of years following blowdown	Number of currently infested trees	Number of newly-attacked trees
year of blowdown	0	100
1	100	50
2	50	12.5
3	12.5	0.5

For every two attacked down trees, the beetles will emerge and attach one standing healthy tree after the first year; for every four standing infested trees in year two, the beetles will emerge and attack one tree; and for every 25 infested trees, the beetles will attack one tree in the third year. This results in about a 63 percent increase in mortality in standing trees over those already blown down. Given no additional windthrow, attack rates generally subside to a background level by the fourth year.

AMBROSIA BEETLES

Any dead or dying Douglas-fir, true fir, hemlock, or pine that is not promptly salvaged is likely to be infested by ambrosia beetles. These beetles generally excavate tunnels in the xylem. These tunnels, which are often surrounded by a dark stain, causes a degrade. While these beetles can cause a degrade in the lumber produced from trees, they do not cause additional mortality to standing trees.

METHODS TO MINIMIZE ADDITIONAL MORTALITY

Historically, salvage logging has been used to limit additional tree mortality. Removal of the down material and standing heavily damaged trees limits the breeding sites for Douglas-fir beetles. Once beetles have left the down material, salvage logging of green infested trees is much more difficult. The green infested trees are difficult to identify since they do not begin to fade until about the june following the year attacked. Since the green infested trees are difficult to locate,and the outbreak is of relatively short duration, a delayed salvage until the outbreak has subsided allows one to capture most of the mortality with only one salvage entry. In areas where prompt salvage is not possible, 3-methyl-2-cyclohexen-1-one (MCH), the anti-aggregation pheromone of DFB, has been shown to reduce the number of beetle attacks on down Douglas-firs. However, the effectiveness of MCH on reducing attacks on live, standing trees has not been demonstrated. While registration has been applied for, MCH is not currently registered. Other actions to interfere with beetle brood production such as physical removal of the trees bark are labor intensive and expensive, but can be effective.

Ambrosia beetle populations can build to very high levels in down and damaged trees. These populations may reduce log quality in the field or in storage areas, but they do not attack standing healthy trees. Prompt removal of logs from the field will minimize their numbers or reduce the chance of logs becomming infested in the field. In storage area, pehromone trapping of ambrosia beetles have has varied success in protecting storage logs.

SUMMARY

On westside forests, the Douglas-fir beetle is expected to be the insect most commonly associated with blowdown. DFB populations on these forests are expected to increase rapidly in the windthrown Douglas-fir. Subsequent tree mortality, however, is expected to be limited to small pockets whose precise location is unpredictable. Since infested trees often do not fade until after the beetles have left the trees, detection of currently infested trees usually requires intensive ground surveys, and reduction of beetle populations through salvage logging is difficult to accomplish. The best known way to prevent significant additional mortality is to remove the down material before beetle populations can emerge from them to attack standing trees. Before any activity, Forests should request a survey of the down material following beetle flight to determine attack density to better predict future population levels. During these surveys, assessment of potential from other beetles can also be made and recommendations provided.